



*The National Centers for Coastal Ocean Science (NCCOS) is the heart of coastal ocean science research within NOAA's National Ocean Service. NCCOS, as a national leader in ocean, coastal, and Great Lakes research, supports research programs that link ecosystem science with the management issues that coastal managers face every day. NCCOS research activities evaluate the health of ecosystems, and the causes and consequences of ecosystem changes, thus helping managers assess the potential consequences of various management strategies. NCCOS uses **Integrated Assessments**—formal bridges between science and management—to integrate and make available the best existing scientific information and management options.*

Who is NCCOS?

NCCOS is a collection of NOAA centers and laboratories with unique sets of capabilities and research expertise in ocean and coastal issues. The Center for Sponsored Coastal Ocean Research and the Center for Coastal Monitoring and Assessment are both located at NCCOS headquarters in Silver Spring, Md. The Center for Coastal Environmental Health and Biomolecular Research is in Charleston, S.C.; its affiliated Oxford Marine Laboratory is in Oxford, Md. The Center for Coastal Fisheries and Habitat Research is located in Beaufort, N.C. The new Hollings Marine Laboratory is in Charleston, S.C. Finally, the Kasitsna Bay Laboratory, in Kasitsna Bay, Alaska, also is part of NCCOS.

What Does NCCOS Do?

Within the geographic scope of the U.S. 200-mile Exclusive Economic Zone, NCCOS conducts most of its research in these areas: **national marine sanctuaries, coral reefs, coastal ocean, and estuaries**. Much estuary research is conducted within the national estuarine research reserves, a network in which NOAA's estuarine science activities are focused.

Within these areas of interest, NCCOS focuses its research efforts on five sources of ecosystem stress:

- **Climate Change**
- **Extreme Natural Events**
- **Invasive Species**
- **Land and Resource Use**
- **Pollution**

NCCOS scientists aim to understand how these "stressors" affect ecosystem health, human health and resources. They are working to assess impacts on coastal communities so that the nation's ocean and coastal resources are more effectively managed.

NCCOS scientists also are pursuing studies in ecological forecasting. **Ecological forecasts** apply



NCCOS scientists work in the field and in the laboratory to understand how "stressors" are affecting our ecosystems.

research results to management problems, allowing coastal managers to better predict future scenarios under various environmental conditions, and thus make better ecosystem management decisions.

Climate Change

Climate change – that which occurs naturally and that which is associated with human activities– can render coastal communities more vulnerable to damage caused by other sources of stress. Scientists are studying the causes and effects of climate change and climate variability. They have noted that corals, wetlands, and estuaries are increasingly stressed from climate change and from human activities.

NCCOS seeks to better understand the relationship of human-induced and natural climate change forces so that potential impacts on critical coastal ecosystems can be predicted and, where possible, mitigated. NCCOS is studying how climate change may lead to changing sea level in some areas and how it may relate to land subsidence. These combined impacts would reduce the amount of coastal land available for use. These conditions also could harm coastal



NCCOS scientists are studying the introduction, spread and impact of the nonnative lionfish, found off the Carolinas.

economies, impair wetland functions, harm coral reefs and shellfish beds, and increase the incidence of invasive species.

Extreme Natural Events

Extreme natural events like hurricanes, floods and droughts can pose risks to coastal communities, causing long-lasting harm to coastal ecosystems and their economies. NCCOS scientists are working to understand how changing quantities of runoff, the timing of extreme events, and the nature and extent of resulting physical damages affect coastal ecosystems. In addition, NCCOS is researching how to forecast expected coastal resource changes resulting from such events.

Weather-related events also may influence harmful algal blooms (HABs). Over the last several decades, HABs have forced valuable shellfish beds and coastal fisheries to close, affected tourism and service industry revenues, and likely caused public illnesses. HABs occur in almost every U.S. coastal state, and data suggest that they are increasing in frequency. NCCOS is developing an early warning system that can help coastal managers plan for and reduce impacts of HABs.

Invasive Species

When exotic plants and animals are brought to the U.S. from other countries or native species are moved to inappropriate areas within the nation's borders, they can change the native community structure and can create economic challenges.

NCCOS scientists conduct research on invasive species. Working with research partners, NCCOS is developing an early warning system that will indicate the early presence of invasive species, first in Hawaii's coastal areas, and later in other U.S. coastal areas. And NCCOS, as a member of the Aquatic Nuisance Species Task Force, is studying developing technologies that may help reduce the impact of invasive species resulting from contaminated ballast water. Among many

other projects, NCCOS scientists are also studying the impact of the nonnative lionfish discovered off Carolina coasts, and determining how to control the European green crab.

Land and Resource Use

An expanding population and associated development are increasing stress on coastal land and resources. NCCOS scientists conduct habitat assessments, contaminant monitoring and biomolecular research to better understand land and resource uses and their potential coastal impacts. For example, NCCOS scientists are studying the effects of increased freshwater flow through the Everglades on Florida Bay. They also are evaluating habitat restoration techniques for seagrass beds, oyster beds and coral reefs.

Pollution

NCCOS scientists are studying nutrient pollution, which can lead to eutrophication—an over-abundance of nutrients that encourage excessive algae growth, reducing oxygen content and killing organisms. Nutrient pollution is linked to many other coastal problems, such as “dead zones,” fish kills, shellfish poisonings, coral reef destruction, and marine mammal and seabird deaths. In addition to nutrient pollution, land-based discharges can degrade surface waters and coasts.

Through the National Status and Trends Program and regional surveys, NCCOS has compiled historical data on contaminant levels in many U.S. estuaries. NCCOS scientists are applying the results of historical and current contaminant studies to determine relation-



NCCOS scientists study the reasons for and impacts of harmful algal blooms, which help coastal managers make wise decisions.

ships between land use and contaminant levels in estuaries. NCCOS scientists are also developing ways to better identify pollution sources in coastal areas. The research teams are tracking molecular, biochemical and chemical fecal sources to better understand how fecal coliform bacteria contaminates estuaries. This approach will help states meet federal pollution control regulations.

